

Integrated Computational Material Engineering Technologies for Additive Manufacturing, Phase I

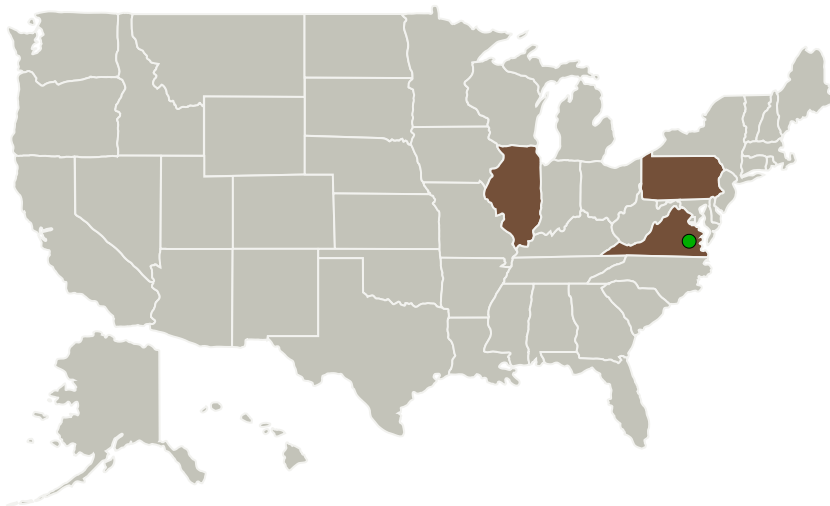
Completed Technology Project (2017 - 2018)



Project Introduction

QuesTek Innovations, a pioneer in Integrated Computational Materials Engineering (ICME) and a Tibbetts Award recipient, is teaming with University of Pittsburgh, proposing to expand their Materials by Design technology and develop the essential ICME technologies that help optimize the additive manufacturing (AM) process of Inconel Alloy 718. One of the biggest hurdles to the adoption of AM of metals is the qualification of additively manufactured parts while currently available systems are based largely on hand-tuned parameters determined by trial-and-error for a limited set of materials with significant uncertainty. A comprehensive ICME approach is needed to address this issue by modeling the process-structure-property chain to predict performance of AM parts. We propose to improve state-of-the-art modeling for AM by coupling FEM codes with materials phase transformation and precipitation simulation software. The Phase I focus on determining the ICME framework architecture and identifying the necessary models as building blocks, as well as key data and experiments for calibration and validation. The resulted ICME tools will enable engineers to develop efficient machines and to optimize and certify AM process and materials, with greatly reduced time, cost, uncertainty, and risk and improved reliability, confidence, and quality assurance.

Primary U.S. Work Locations and Key Partners



Integrated Computational Material Engineering Technologies for Additive Manufacturing, Phase I Briefing Chart Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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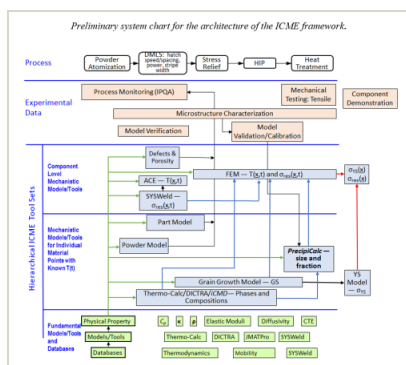


Organizations Performing Work	Role	Type	Location
QuesTek Innovations LLC	Lead Organization	Industry	Evanston, Illinois
● Langley Research Center (LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
University of Pittsburgh-Pittsburgh Campus	Supporting Organization	Academia	Pittsburgh, Pennsylvania

Primary U.S. Work Locations

Illinois	Pennsylvania
Virginia	

Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/128419>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

QuesTek Innovations LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

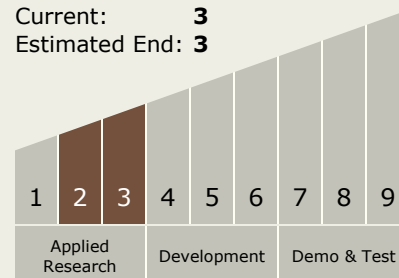
Carlos Torrez

Principal Investigator:

Jiadong Gong

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.2 Computational Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System